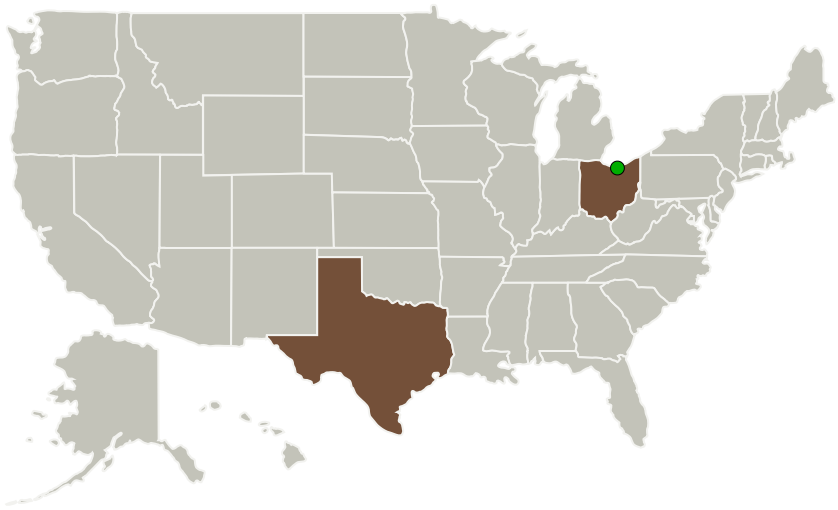
Multi-Purpose X-ray System, Phase II

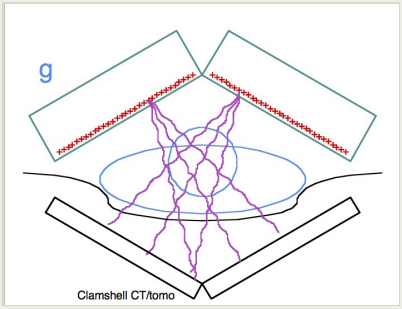
Completed Technology Project (2017 - 2019)

Project Introduction

The proposed Multi-Purpose X-ray Source and System (MPXS) can be used on flight missions, space stations, planetary excursions and planetary or asteroid bases, to meet nearly all NASA imaging needs in the Exploration Medical Condition List (EMCL). This includes a range of radiographic imaging modalities - 2D, digital tomosynthesis and half or full CT to cover routine and emergency imaging needs. The MPXS source is comprised of sections, each designed for a specific range of x-ray imaging conditions. The source is currently designed as a rectangular box made primarily of aluminum nitride (AlN) sheets. Each AlN sidewall has a window that allows x-ray flux to exit. The window can be a hollow section of the sidewall or a thin strip of low Z material over a window aperture in the sidewall. Thin strips of metal can be placed over the windows for beam filtration. Each window will output flux from one or more rows of spots (x-ray pixels, or xels) on the metal anode inside, for example a 1 x 30 xel row. These xels are digitally addressed with separate electron beams from field emission cold cathodes in the cathode array. The system will comprise one or more sources, paired with one or more digital x-ray detectors, controlled by software loaded on a laptop or mission systems. Each pair will weigh less than 0.1% of a current tomographic imaging system in less than 0.1% of the volume. Extensions to the source design can reduce these figures even further. The programmability of the x-ray flux sequences/patterns from the sources will enable the range of imaging modalities, and make MPXS well suited to use with emerging AI capabilities in radiographic diagnosis.

Primary U.S. Work Locations and Key Partners





Multi-Purpose X-ray System, Phase II Briefing Chart Image

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Completed Technology Project (2017 - 2019)

Organizations Performing Work	Role	Type	Location
Stellarray, Inc.	Lead Organization	Industry	Austin, Texas
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Texas

Project Transitions

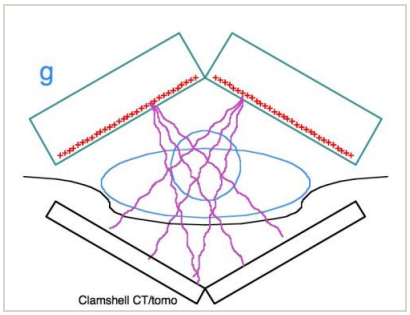
April 2017: Project Start

June 2019: Closed out

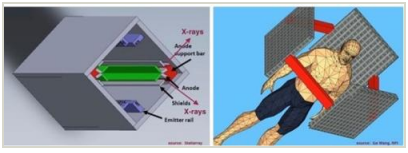
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140868)*

Images



Briefing Chart Image
Multi-Purpose X-ray System, Phase II Briefing Chart Image
(https://techport.nasa.gov/image/137031)



Final Summary Chart Image
Multi-Purpose X-ray System, Phase II
(https://techport.nasa.gov/image/126298)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Stellarray, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

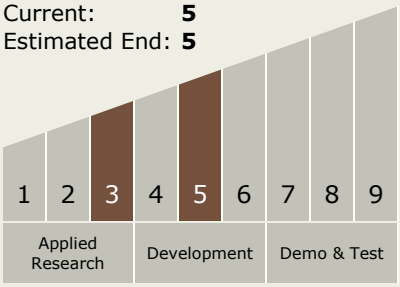
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Ronald Hellmer

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Multi-Purpose X-ray System, Phase II

Completed Technology Project (2017 - 2019)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.1 Medical Diagnosis and Prognosis

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System